DAQ and Thresholds

Leon Mualem
University of Minnesota

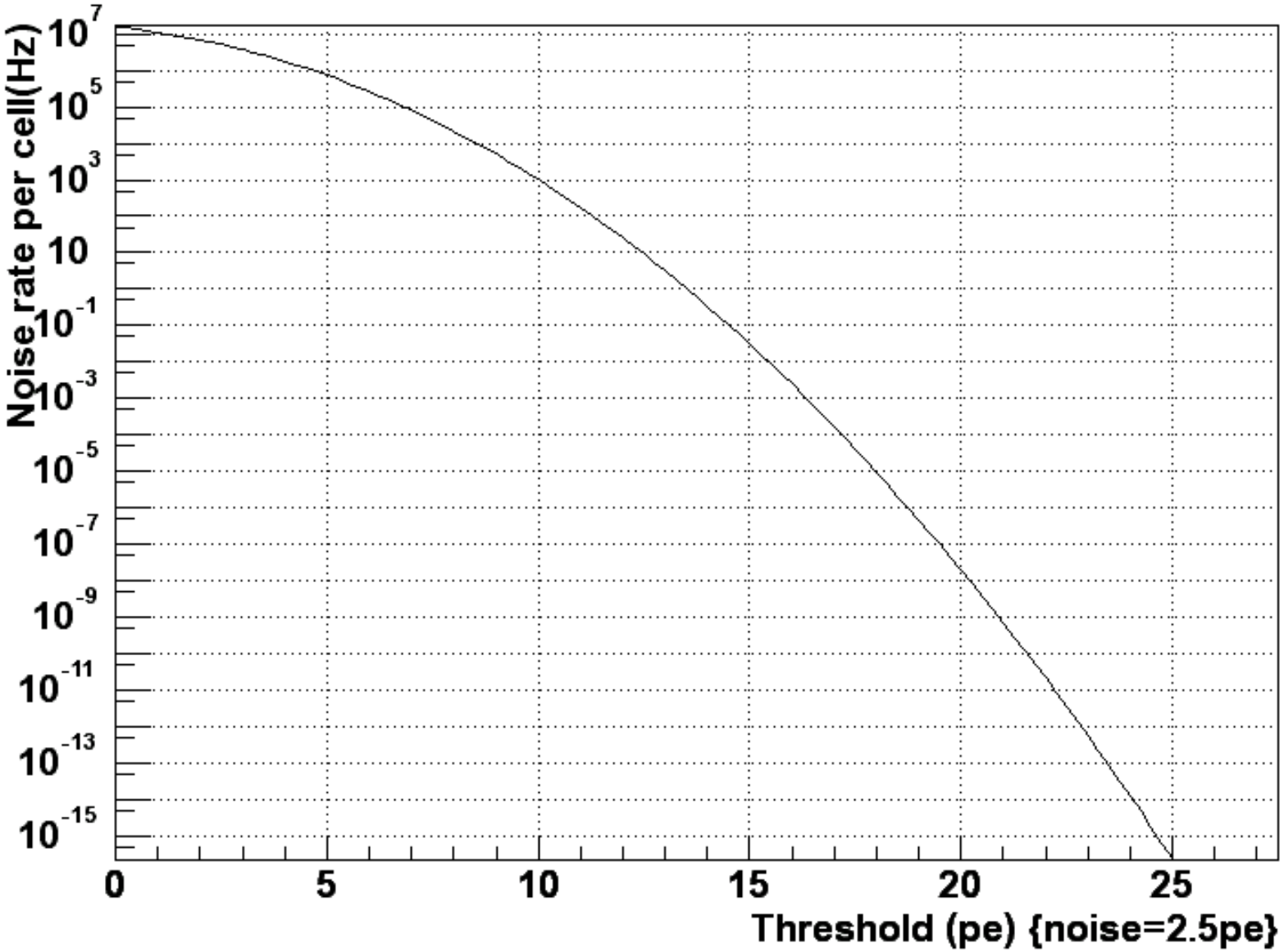
Data Rates

- Driven by cosmic muons, ~250kHz, leading to ~400Hz/channel or 12kHz/module rate
  - 120kB/module/s
  - But 23,808*120kB/s=~3GB/s

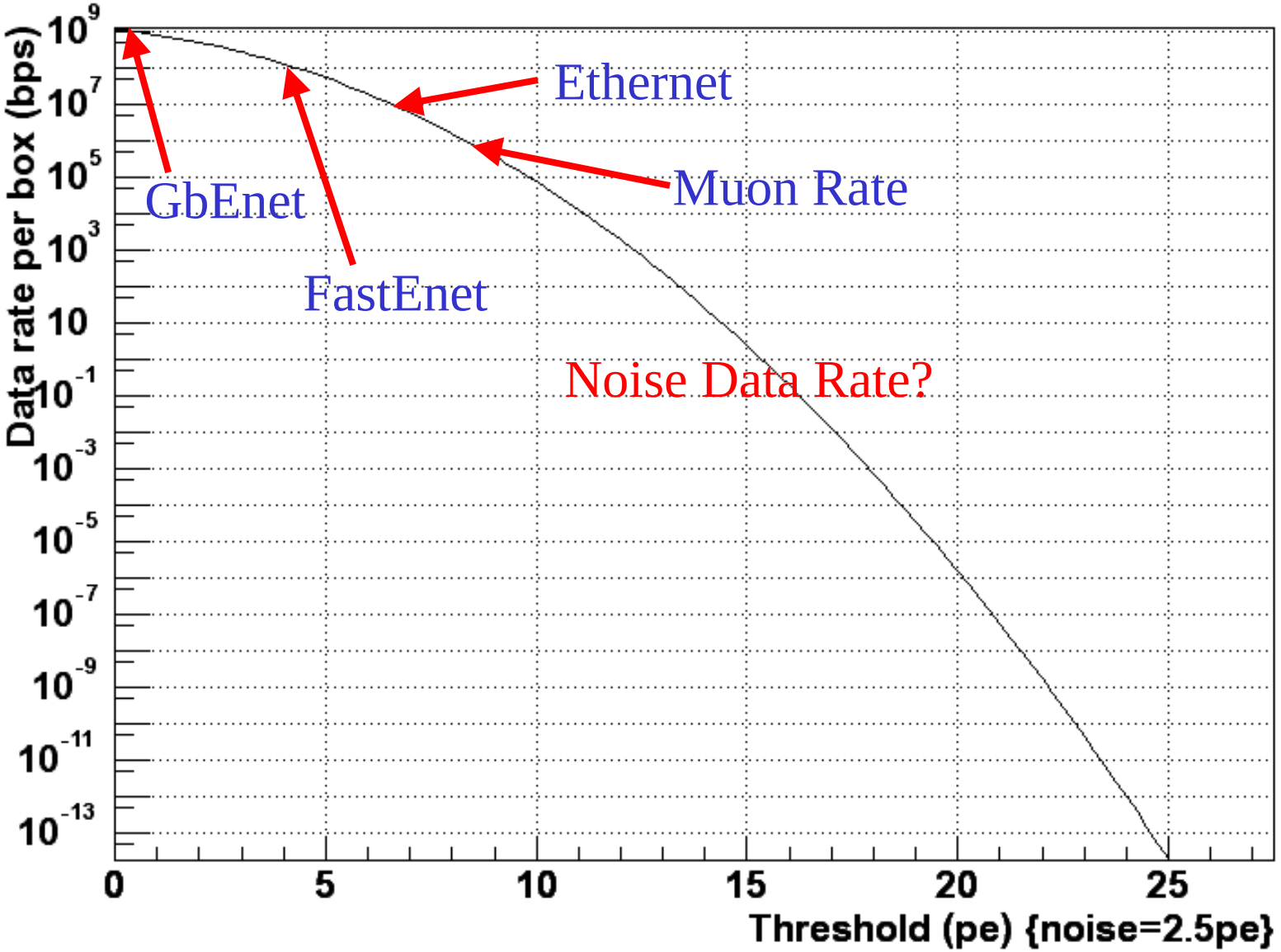
Noise Data Rates

- Determined by noise level and threshold
- Noise ~Gaussian σ=2.5pe
- Data output 10 bytes/hit above threshold
- 10^6 time slices per second
- Maximum data rate—
  32chan*10bytes*8bits/byte*10^6=2.5Gbps/box
- 23,808*2.5Gbps=~60TB/s

Noise Rate per box vs. Threshold



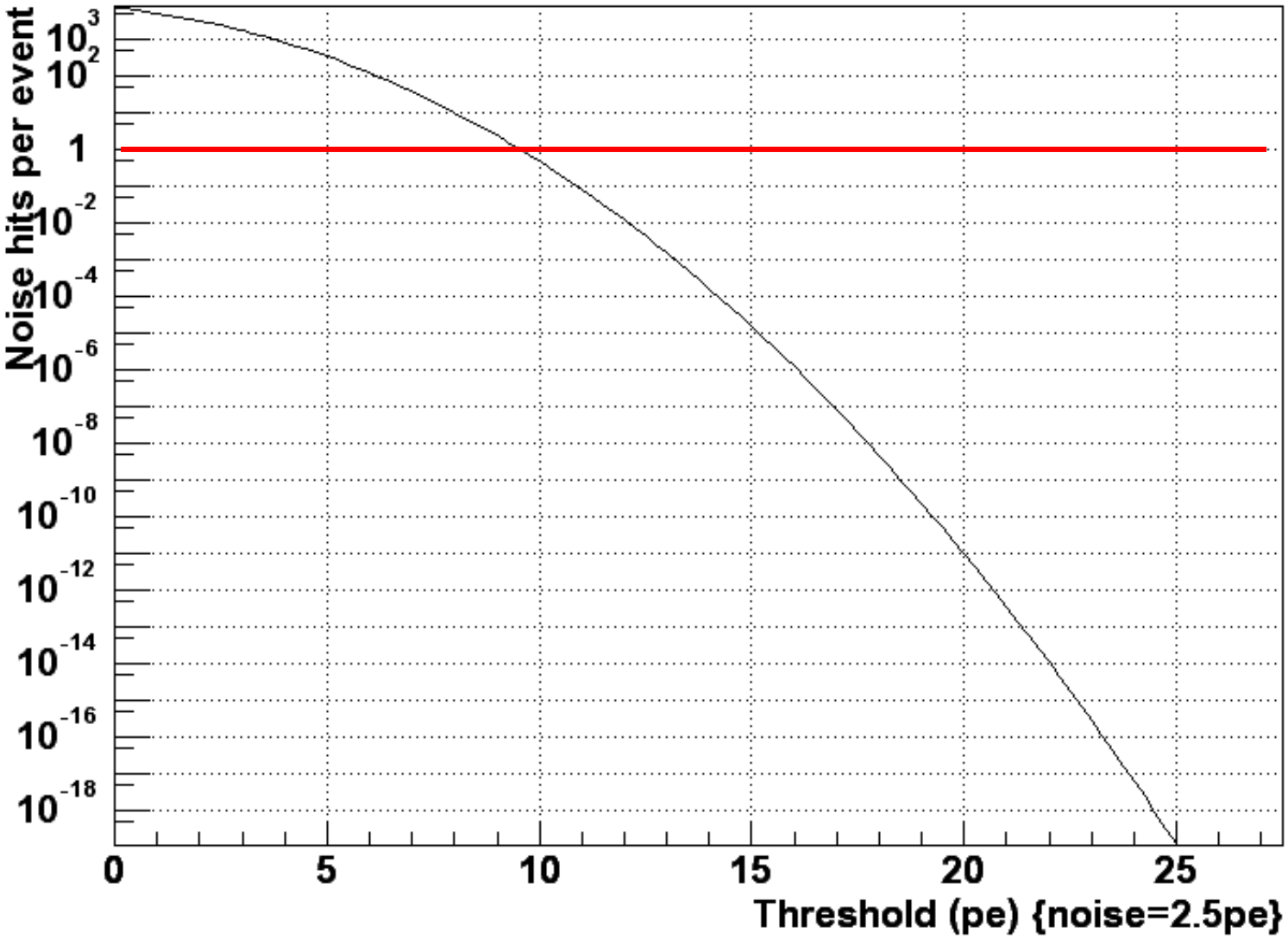
Noise Data Rate vs. Threshold



Noise in Events

- Largest events are quasielastic numucc events.
- Assume ~2m in each view, 50 strips
- ~100 planes/GeV, ~300 planes long
- ~15000 strips in an event
- Use the noise rate and the number of strips to calculate the noise contamination of an event.

Noise per event vs. Threshold



Conclusions

- DAQ rate limit (ethernet) limits threshold to ~8pe minimum
- Contamination of events ~10 noise hits per event at 8pe, ~1 hit/event at 9pe.
  - 10 hits at 8pe ≈<30MeV
- 8pe = 3.2σ for noise of 2.5pe
- Add some conservatism, demonstrated 3.1pe noise so far, so use 3.2*3.1=10pe
  - (had been using 12 before)